In the Claims:

1. (Currently amended) A method of transmitting signals using a plurality of transmit antennas, the method comprising:

allocating the data to be transmitted among the plurality of transmit antennas, wherein at least one of the plurality of transmit antennas transmits some data that is not transmitted by all of the other of the plurality of transmit antennas;

transmitting a modified preamble from each of the plurality of transmit antennas, wherein the modified preamble comprises a conventional 802.11a preamble including an 802.11a short training field, an 802.11a long training field, and additional preamble fields, ~~structure and~~ which is distinguishable at a receiver from a conventional 802.11a preamble.

2. (Original) The method of claim 1, wherein the plurality of transmitters transmit data in total at an extended rate above a corresponding 802.11a data rate.

Claims 3-6 (Canceled)

7. (Original) A method of transmitting signals using a plurality of transmit channels, the method comprising:

allocating the data to be transmitted among the plurality of transmit channels, wherein at least one of the plurality of transmit channels transports some data that is not transmitted over all of the other of the plurality of transmit channels;

transmitting a modified preamble from each of the plurality of transmit channels, wherein the modified preamble is distinguishable at a receiver from a conventional 802.11a preamble and includes an out-of-band component.

8. (Original) The method of claim 7, wherein the plurality of transmit channels comprise a plurality of frequency channels.

9. (Original) The method of claim 8, wherein the plurality of frequency channels are adjacent 20 MHz channels.

10. (Original) A method of transmitting signals using a plurality of transmit channels, the method comprising:

allocating the data to be transmitted among the plurality of transmit channels, wherein at least one of the plurality of transmit channels transports some data that is not transmitted over all of the other of the plurality of transmit channels;

for at least one set of at least two adjacent transmit channels, transmitting data over the set wherein at least some data is encoded in out-of-band subcarriers at frequencies between frequencies allocated to the at least two adjacent transmit channels.

11. (Original) In a communications system having a channel divided into a plurality of adjacent frequency bands separated by out-of-band frequency ranges, wherein data is transmitted within the bands of the plurality of frequency bands, a method of increasing data capacity of the channel comprising:

for data to be transmitted from a transmitter, allocating a first portion of the data among the plurality of transmit frequency bands and allocating a second portion of the data to at least one out-of-band frequency range when the first portion is allocated to adjacent bands, wherein the at least one out-of-band frequency range includes an out-of-band frequency range between the adjacent bands;

transmitting the first portion within the plurality of transmit frequency bands; and

transmitting the second portion within the at least one out-of-band frequency range.

12. (Original) The method of claim 11, further comprising:

prior to transmitting at least the second portion of the data, transmitting one or more training symbols usable for a receiver to estimate transmission characteristics of the out-of-band frequency ranges; and

using received signal of the one or more training symbols to modify processing of a received signal corresponding to the second portion of the data to account for the transmission characteristics of the out-of-band frequency ranges.

13. (Currently amended) A method of discriminating between a packet sent as a conventional 802.11a packet and a packet sent using an extended mode not normally supported under the conventional 802.11a standard, the method comprising:

receiving a signal from a wireless medium, wherein the signal was transmitted from an extended mode transmitter as a packet wherein packet data is preceded by a packet preamble and wherein the packet preamble is generated from a cyclically shifted 802.11a preamble including an 802.11a short training field and an 802.11a long training field;

demodulating the signal to obtain a demodulated signal;

decoding, from the demodulated signal, a packet data sequence including a cyclically shifted 802.11a preamble when receiving packet data from an extended mode transmitter and a conventional 802.11a preamble when receiving packet data from a conventional 802.11a transmitter; and

discriminating as to which type of packet was sent based on the received packet data sequence.

14. (Original) The method of claim 13, wherein the extended mode includes at least a MIMO extended mode wherein the packet preamble is generated from the cyclically shifted 802.11a preamble.

15. (Original) The method of claim 14, further comprising performing MIMO channel estimation using the received preamble data.

16. (Previously presented) The method of claim 13, further comprising performing MIMO channel estimation using the received preamble data.

17. (Original) The method of claim 13, wherein the signal transmitted from an extended mode transmitter is such that legacy devices can decode a signal field of the preamble.

18. (Original) The method of claim 13, further comprising detecting that the signal transmitted used from an extended mode transmitter using a MIMO mode, the detecting using at least one out-of-band subcarrier.

19. (Original) The method of claim 13, further comprising detecting that the signal transmitted used from an extended mode transmitter using a MIMO mode, the detecting including detecting a presence of cyclically shifted preamble components.

20. (Currently amended) A method of transmitting a packet, using a MIMO transmitter having a plurality of antennas, over a wireless network, the method comprising:

obtaining data fields of a packet to be transmitted;

generating preamble fields of the packet to be transmitted, including an extended mode preamble distinguishable at a receiver from a conventional 802.11a preamble, the extended mode preamble including a ~~enough of a conventional~~ 802.11a preamble including an 802.11a short training field, an 802.11a long training field, and additional preamble fields ~~structure~~ such that a conventional 802.11a receiver can decode a portion ~~one or more fields~~ of the extended mode preamble and defer processing of incoming signals; and

transmitting the packet including the extended mode preamble.

Claims 21-22 (Canceled)

23. (Original) The method of claim 20, wherein the fields of the extended mode preamble include a modified signal field.

24. (Currently amended) A method of communicating a packet, using a MIMO transmitter having a plurality of antennas, over a wireless medium to a MIMO receiver, the method comprising:

obtaining data fields of a packet to be transmitted;

generating preamble fields of the packet to be transmitted, including an extended mode preamble;

transmitting the packet, including the extended mode preamble, as a signal into the wireless medium;

receiving a representation of the signal from a wireless medium;

at a receiver, demodulating the signal to obtain a demodulated signal;

at the receiver, decoding, from the demodulated signal, a packet data sequence including data representing at least a portion of a preamble;

where the receiver is a MIMO receiver, processing the packet data sequence according to an extended mode operation; and

where the receiver is a conventional 802.11a receiver, processing the packet data sequence to determine at least ~~one valid conventional~~ 802.11a short training and long training preamble fields and deferring further data reception related to that packet data sequence after determining, from the preamble, that the packet data sequence represents a packet not in conformance with a conventional 802.11a packet.

Claims 25-26 (Canceled)

27. (Original) The method of claim 24, wherein the fields of the extended mode preamble include a modified signal field.

28. (Currently amended) A method of transmitting signals using a plurality of transmit channels, the method comprising:

allocating the data to be transmitted among the plurality of transmit channels, wherein at least one of the plurality of transmit channels transports some data that is not transmitted over all of the other of the plurality of transmit channels;

transmitting a modified preamble including 802.11a short training and long training preamble fields from each of the plurality of transmit channels, wherein the modified preamble is usable for performing channel estimation and at least a -part of the modified preamble for at least a first of the plurality of transmit channels is a cyclically shifted version of a corresponding part of the modified preamble for at least a second of the plurality of transmit channels.

Claims 29-30. (Canceled)

31. (Previously presented) The method of claim 28, further comprising MIMO synchronization.

32. (Previously presented) The method of claim 28, wherein the data to be transmitted is

allocated to a plurality of subcarriers, the subcarriers of the plurality of subcarriers are allocated among transmit channels, and each transmit channel is associated with a distinct antenna.

33. (Previously presented) The method of claim 28, wherein the data to be transmitted is allocated to a plurality of subcarriers and some of the subcarriers of the plurality of subcarriers are inverted relative to other subcarriers of the plurality of subcarriers

34. (Previously presented) The method of claim 28, wherein the data to be transmitted is allocated to a plurality of subcarriers including at least one out-of-band subcarrier.

35. (Previously presented) The method of claim 28, further comprising estimating channel response by:

receiving signals and sampling for a long training symbol;

computing a 64-point FFT of the received long training symbol;

multiplying each subcarrier by known pilot values;

computing an IFFT of the result of the multiplication, resulting in a 64-point impulse response estimate;

isolating each of a plurality of impulse responses, one per MIMO transmitter; and

deriving channel estimates for all subcarriers from the isolated impulse responses by taking a 64-point FFT of each of the plurality of impulse responses, where the sample values are appended by zero values to get 64 input values as needed.

36. (Previously presented) The method of claim 28, wherein said part and said corresponding part comprise long training fields.

37. (Previously presented) The method of claim 28, wherein said part and said corresponding part comprise signal fields.

38. (Currently amended) A method of transmitting an extended mode packet intended for extended 802.11 receivers in a wireless medium, the method comprising:

transmitting a modified preamble, the modified preamble comprising:

data corresponding to extensions to IEEE 802.11a; and

a plurality of fields decodable by a conventional 802.11a receiver, including 802.11a short training and long training preamble fields, such that a conventional 802.11a receiver that receives the extended mode packet can detect the packet or defer processing for the length of the packet; and

transmitting a remainder of the extended mode packet.

39. (Previously presented) The method of claim 38, wherein the plurality of fields decodable by the conventional 802.11a receiver comprises a plurality of fields having a conventional 802.11a preamble timing structure.

40. (Previously presented) The method of claim 38, wherein the plurality of fields decodable by the conventional 802.11a receiver comprises an 8 μs short training field followed by an 8 μs long training field followed by a 4μs signal field.

41. (Previously presented) The method of claim 38, wherein the plurality of fields comprises a signal field having a conventional 802.11a timing structure.

42. (Previously presented). The method of claim 41, wherein said signal field includes information identifying the length of the packet.

43. (Previously presented). The method of claim 41, wherein the modified preamble further comprises an additional signal field including said data corresponding to extensions to IEEE 802.11a.

44. (Previously presented) The method of claim 38, wherein the data corresponding to extensions to IEEE 802.11a comprises data corresponding to MIMO.

45. (Previously presented) The method of claim 38, wherein the data corresponding to extensions to IEEE 802.11a comprise data corresponding to simultaneous transmission over multiple channels.

46. (Previously presented) The method of claim 38, wherein the data corresponding to extensions to IEEE 802.11a comprise data corresponding to transmission in a 40 MHz extended 802.11 mode.

47. (Currently amended) A method of transmitting an extended mode packet intended for extended 802.11 receivers in a wireless medium, the method comprising:

transmitting a modified preamble over a plurality of channels, the modified preamble comprising a plurality of fields decodable by a conventional 802.11a receiver, including 802.11a short training and long training preamble fields, transmitted over each channel such that a conventional 802.11a receiver operating on only one of the channels can detect the packet or defer processing for the length of the incoming packet; and

transmitting a remainder of the extended mode packet over the plurality of channels.

48. (Previously presented) The method of claim 47, wherein the plurality of fields decodable by the conventional 802.11a receiver comprises an 8 μs short training field followed by an 8 μs long training field followed by a 4μs signal field.

49. (Previously presented). The method of claim 47, wherein the modified preamble further comprises data corresponding to extensions to IEEE 802.11a.

50. (Previously presented) The method of claim 49, wherein the data corresponding to extensions to IEEE 802.11a includes data corresponding to MIMO.

50. (Previously presented) The method of claim 47, wherein transmitting the modified preamble over a plurality of channels comprises transmitting the modified preamble over a 40 MHz channel, and wherein the plurality of fields decodable by a conventional 802.11a receiver are transmitted over each of two 20 MHz channels comprising the 40 MHz channel.

51. (Previously presented) A method of transmitting an extended mode packet intended for extended 802.11 receivers in a wireless medium, the method comprising:

transmitting a modified preamble, the modified preamble comprising data transmitted on subcarriers considered out-of-band subcarriers by conventional 802.11a receivers, the modified preamble comprising a plurality of fields decodable by a conventional 802.11a receiver such that a conventional 802.11a receiver that receives the packet can detect the packet or defer processing for the length of the packet; and

transmitting a remainder of the extended mode packet.

52. (Previously presented) The method of claim 51, wherein said transmitting the modified preamble comprises transmitting the modified preamble over a 40 MHz channel comprising two adjacent 20 MHz channels, and

wherein the out-of-band subcarriers comprises subcarriers between the adjacent 20 MHz channels.

53. (Previously presented) The method of claim 51, wherein the out-of-band subcarriers comprise subcarriers in addition to the 52 non-zero subcarriers utilized by conventional 802.11a receivers for 20 MHz transmission.

54. (Previously presented) The method of claim 51, wherein said transmitting the remainder of the extended mode packet comprises transmitting the remainder of the extended mode packet using said out-of-band subcarriers.

55. (Previously presented) A method of transmitting an extended mode packet intended for extended 802.11 receivers in a wireless medium, the method comprising:

transmitting a modified preamble from each of a plurality of antennas, the modified preamble comprising a plurality of fields having a conventional 802.11a timing structure and 802.11a short training and long training preamble fields, wherein at least one of said fields is transmitted by each of said plurality of antennas with a cyclic delay shift between different antennas.

56. (Previously presented) The method of claim 55, wherein the plurality of fields includes data corresponding to extensions to IEEE 802.11a.

57. (Previously presented) The method of claim 55, wherein one of the plurality of fields comprises a long training field including data corresponding to MIMO transmission and reception.

58. (Previously presented) The method of claim 55, wherein the plurality of fields are decodable by a conventional 802.11a receiver such that a conventional 802.11a receiver that receives the extended mode packet can detect the packet or defer processing for the length of the packet, and

wherein the modified preamble further comprises one or more fields including data corresponding to extensions to IEEE 802.11a.

59. (Currently amended) A wireless communication device comprising:

an extended 802.11 transmitter operative to allocate data to be transmitted among a plurality of transmit antennas, such that at least one of the plurality of transmit antennas will transmit some data that is not transmitted by all of the other of the plurality of transmit antennas, and operative to prepare a modified preamble for transmission from each of the plurality of transmit antennas,

wherein the modified preamble comprises a conventional 802.11a preamble, including short training and long training preamble fields, ~~structure~~ and is distinguishable at a receiver from a conventional 802.11a preamble.

60. (Currently amended) A wireless communication device comprising:

means for allocating the data to be transmitted among the plurality of transmit antennas, wherein at least one of the plurality of transmit antennas transmits some data that is not transmitted by all of the other of the plurality of transmit antennas;

means for transmitting a modified preamble from each of the plurality of transmit antennas, wherein the modified preamble comprises a conventional 802.11a preamble, including short training and long training preamble fields, ~~structure~~ and is distinguishable at a receiver from a conventional 802.11a preamble.

61. (Canceled)